

White Paper Report

Report ID: 98507

Application Number: HD5076909

Project Director: Bethany Nowviskie (bethany@virginia.edu)

Institution: University of Virginia

Reporting Period: 9/1/2009-8/31/2010

Report Due: 3/31/2011

Date Submitted: 3/27/2011

National Endowment for the Humanities

WHITE PAPER

Grant #HD5076909

Neatline:

Facilitating Geospatial and Temporal Interpretation of Archival Collections

Project Directors:

Bethany Nowviskie

Adam Soroka

Scholars' Lab

University of Virginia Library

27 March 2011

Introduction

In September 2009, with Level II Digital Humanities Start-Up funding from the National Endowment for the Humanities, the Scholars' Lab at the University of Virginia Library initiated *Neatline*, a project to develop a user-friendly tool with which students and scholars could generate interpretive expressions of the literary or historical content of archival collections. Such "scholarly expressions" in Neatline -- which remains a work in progress -- take the form of customizable, interlinked and interactive timelines and maps, easily publishable to the Web. They are built using flexible, open-source geospatial software and standards-based approaches to GIS, and they permit users to draw heavily on digitized archival content and standardized metadata created by librarians. That said, each Neatline exhibit is imagined as a carefully-designed narrative -- a story told in time and space through small-scale interpretive decision-making by scholars and archivists, rather than (as is more commonly pursued in our era of "big data") an algorithmically-derived or data-driven geotemporal information visualization.

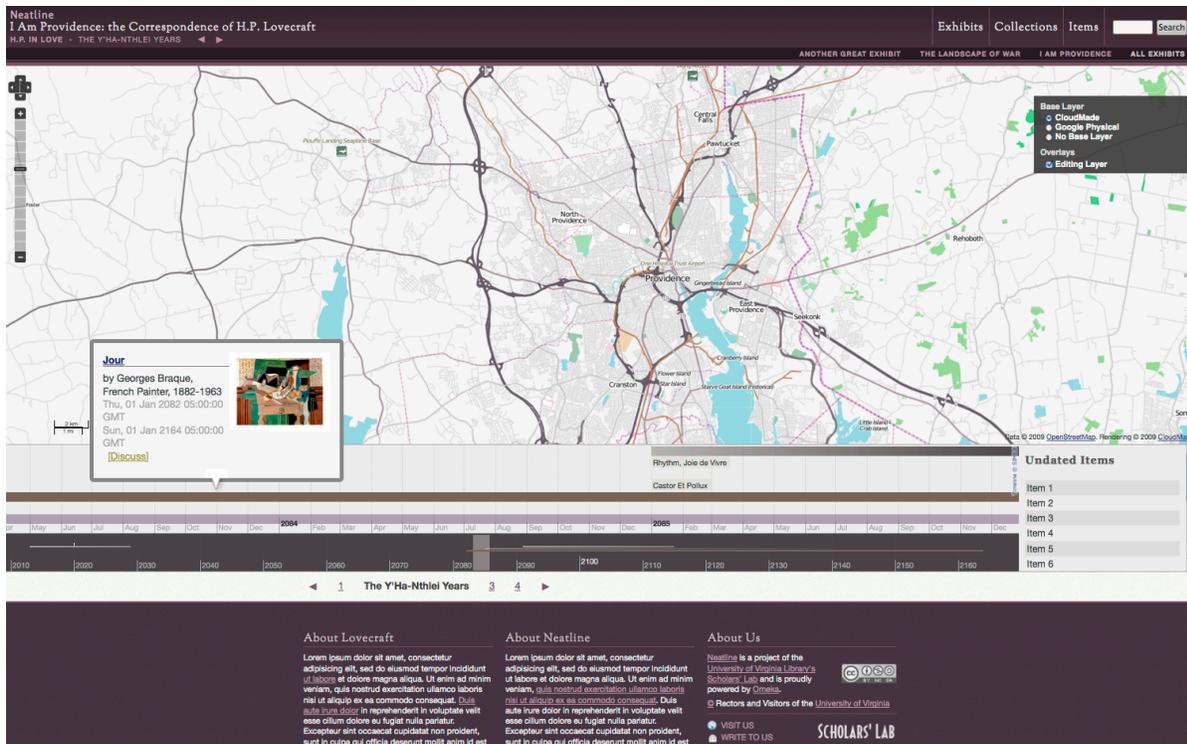


Fig. 1: The primary editing and geo-temporal storytelling interface of Neatline.

This white paper describes: 1) the theoretical goals of Neatline, including a role for iterative sketching (or *graphesis*) and hand-craftedness in digital interpretive toolbuilding; 2) activity undertaken in the Start-Up period, including shifts in project scope and planned outcomes that came with a decision to architect Neatline as a set of mix-and-match plugins for Omeka, an open-source platform for online collections and exhibits; and 3) the Scholars' Lab's ongoing work on Neatline, beyond the scope of the Start-Up grant, funded by the Library of Congress and undertaken in partnership with the Center for History and New Media at George Mason University. In the broadest terms, Neatline is conceived as a contribution -- within the visual vernacular -- to multidisciplinary, place-based scholarship using primary sources.

As a Start-Up project, Neatline made three claims to innovation or a shifting of the landscape of geo-temporal visualization in the humanities (itself described in more depth in the next section of this report). First, by building on primary resources expressed in EAD (“encoded archival description”) metadata -- among other standards, such as VRA Core - - Neatline creates a path for collaborative contribution by libraries and cultural heritage institutions to the hermeneutic scholarly process. Although EAD has been employed by academics working in concert with archivists, as in case of the Walt Whitman Archive, its use has typically been straightforwardly bibliographical, as a finding aid and for the production of catalogs of manuscripts and letters. EAD has yet to be used by scholars as a stepping-stone to rich, interpretive or theory-based expression (much less visualization) of the *content* of those primary resources. The Neatline project aims to demonstrate the value of archival metadata to interpretive scholarship, and thereby strengthen connections among scholars and collections stewards.

Next, Neatline aimed to provide a seamless, out-of-the-box experience for scholarly end-users. This was a major argument in our bid for NEH funding, and our rationale for shifting from development of a promised stand-alone, downloadable tool (installable as a single, server-side application), to a functionally atomized array of interchangeable plugins for Omeka (<http://omeka.org>) is arguably the most important contribution of the project to the current scene of digital humanities tool production. Neatline as initially conceived

would be simple to install and use, removing the major hurdle of need for technical support by multimedia developers or GIS consultants and allowing for low-risk experimentation and easy Web publication by students and scholars engaged with primary resources. As soon as a user imported EAD and map data (easy to acquire from libraries and archives), he or she would see a basic timeline and an open geographical field, ready for selection, annotation, and geo-referencing. Neatline was imagined as a self-contained, self-service, single-function tool that nonetheless allowed expert users easy access “under the hood” to customize and contribute to its open source code. For a stand-alone tool, this would have been the right approach; but we quickly realized that, with Neatline, we had the opportunity to model a more productive and collaborative set of digital humanities software practices. The Scholars’ Lab has now shared source code for 9 completed or in-progress Neatline-related plugins with the Omeka developers’ community, and Omeka forms the backbone for basic content management functionality in our project. We feel strongly that our shift to Omeka plugin production retains or enhances all of the desired qualities of our originally-proposed system, while adding two great benefits: 1) no longer must users assent to the entire, ideal Neatline workflow in order to make use of our work -- and in fact we are seeing great interest in and use of individual plugins in Omeka user communities and scholarly and archival contexts far removed from those interested in geo-temporal interpretation; and 2) our close collaboration with the Omeka team and open source developers’ community is leading to advancements in the core code of Omeka itself, again benefiting a far wider audience than our Start-Up grant anticipated. Not only were

we able to leverage Omeka as a technical and social framework for Neatline, but our plugins and the improvements our work has prompted in Omeka core have made this excellent system a more attractive option for research and special collections libraries -- even those with sophisticated technical and repository infrastructure of their own.

Finally, Neatline makes a theoretical contribution to the digital humanities by emphasizing hand-crafted visualization (a practice we have, after the experimentation of the UVA's now-defunct SpecLab thinktank and the scholarship of Johanna Drucker, called *graphesis*) as a mode of praxis and scholarly inquiry. Low-tech sketching and storyboarding is regularly taught as part of the earliest design processes for digital projects in the Scholars' Lab. A side effect of the Neatline tool is to demonstrate -- to fields like history and literary studies, in which interpretation of visual artifacts themselves is rarely taught and drawing as a way of knowing is infrequently modeled -- the value of iterative interpretation and knowledge-production manifested in visual form. We have emphasized this by designing, wherever possible within the Omeka framework, drawing and editing interfaces that are relatively simple to use and nearly identical to a finished, end-user's view. Scholars who use Neatline are always sketching, erasing, and sketching again their arguments on the screen.

Our map and timeline-related plugins are designed to offer Neatline users the ability to model multiple backgrounds independently from the foreground of their critical attention, and express all of these fields and their interrelation visually. The spatial and temporal

foreground stands as a place for scholarly commentary (textual annotation as well as intervention in the visual field by means of the freehand drawing of lines and shapes), while user-specified Neatline backgrounds can be empirical or unabashedly subjective, absolutely geo-referenced or wholly speculative. For example, in one local (yet unreleased) test case which uses the maps and letters of Civil War cartographer Jedediah Hotchkiss, backgrounds are brought in from modern satellite imagery, from Hotchkiss's own surveyed-and-drawn maps (including not only military plans but also sketches sent home in letters to his family), and from the historical maps that served as the surveyor's own mental "base layer." By operating on archival metadata -- itself already an interpretation of a literary or historical collection -- to allow scholars literally to *illustrate* connections among documents and the spatial and temporal dimensions of their textual content, Neatline embodies a theme of much work in the Scholars' Lab: that method is a path to argument, and that there are cases when even very traditional interpretive humanities scholarship is best enacted in iterative, visual modes.

Project Outcomes

Concrete products of the grant included advancements, in collaboration with CHNM, to the code Omeka codebase and wholesale creation by the Scholars' Lab of a suite of plugin software for the Omeka framework. These plugins are usable independently but gain value

in combination, comprising the Neatline system. They are described in much greater depth under the heading “Neatline’s Architecture and Feature Set,” below.

1. EAD Importer: allows for the easy and easily-adjusted import of of Encoded Archival Description finding aid information into an Omeka instance.
2. Neatline Maps: provides connection to one or more GeoServer instances as well as any specification-compliant WMS service.
3. Neatline Features: offers the ability to encode and edit geospatial shape information using a pleasant graphical interface.
4. Timeline plugin: incorporates the well-known Simile Timeline Javascript framework into Omeka to provide chronological visualization of Omeka items.
5. Neatline Theme: provides facilities for combining Neatline and Omeka information into unified interactive presentations.

In addition, our work on Neatline led us to develop five further plugins, not necessarily integral to our initial, proposed use case, but which Neatline users may employ as part of their Omeka exhibits. These plugins greatly extend the capacity of Omeka and make it a more attractive option for better-resourced libraries and cultural heritage institutions -- the very constituency best positioned to contribute further development time to the open source code of Neatline and Omeka alike.

1. FedoraConnector: makes it possible to display, comment on, annotate, and otherwise employ objects inheriting behaviors from a Fedora Commons repository.
2. GenericXmlImporter: permits users to import any arbitrary, flat XML data into Omeka.
3. SolrSearch: allows use of the Solr search engine with Omeka, facilitating improved search and implementing faceted browsing.
4. TeiDisplay: allows users to render TEI files in HTML form and attached them to Omeka items. This plugin integrates with SolrSearch for indexing.
5. VRACoreElementSet: allows users to bring the VRA Core Element Set (for visual resources) into Omeka.

Work on all of these (and on additional Neatline-related plugins and extensions to Omeka) will continue under the rubric of an “Omeka + Neatline” partnership with the Center for History and New Media, funded through 2013 by a contract with the Library of Congress. This collaborative partnership, which we consider a major outcome of NEH’s investment in the Neatline project, is described under “Next Steps,” below.

Contexts: Scholarly, Technical, and Institutional

Sophisticated geo-temporal visualization is not new to the humanities – nor is it a

phenomenon unique to digital practitioners and their methods. We will not rehearse the full range and critical tradition of map- and timeline-making in print and printed scholarship. Minard's 1869 time-based map of Napoleonic troop movements has (thanks to Edward Tufte's evangelism) become a tired commonplace in design discussions, but these point to a rich set of print-media approaches – many cataloged and analyzed by scholars like J.B. Harley, Mark Monmonier, John Krygier, and Dennis Wood – on which Neatline has drawn for visual inspiration. For interpretive examples in history and literary studies, the two initial fields Neatline proposed to address, we looked first to the synthetic work of Alan Baker and of Anne Knowles in describing historical applications of geography and geographical information systems (GIS), and then to the critical uses of geography by scholars like J. Hillis Miller (on Hardy) or John Gillies (on Shakespeare), as well as to the formal experimentalism of Franco Moretti in graphing and mapping literary texts for knowledge discovery.

Among digital centers, our local partners at UVA's IATH (the Institute for Advanced Technology in the Humanities) have long been leaders in the production of Web-based maps and timelines, and the recent establishment of a "Spatial History Lab" at Stanford and a "Digital Cultural Mapping" program at UCLA is a mark of the currency of these approaches to humanities inquiry and pedagogy at other institutions. However, most geo-temporal interface development by scholars has either required use of expensive, proprietary desktop GIS software or has been in a "one-off" mode – as with Ben Ray's

notable Flash map of accusations in the Salem Witch Trials – not utilizing community-supported open-source toolsets or building on common standards. Furthermore, production of geo-temporal visualization has typically required scholars to partner intensively with technical staff to make any headway in their work. All of these factors have contributed to what Martyn Jessop, in a 2008 article in *Literary and Linguistic Computing*, termed an “inhibition of geographical information in digital humanities scholarship” -- a provocation that led the Scholars’ Lab, during the course of our work on Neatline, to host three tracks of an NEH-funded Institute for Enabling Geospatial Scholarship, from which reports and a public, community-driven “Spatial Humanities” website are forthcoming in early 2011.

Surprisingly, it is only lately that commercial, desktop GIS toolsets – primarily created for use in synchronic contexts in the sciences – have begun to account for time as a matter of course. And relatively recent development of generalized, Web-based tools and services for timeline and map creation either continues in the vein of one-off production or has other key failings that limit usefulness and adoption in a humanities context. None of the proliferating tools that build on Google Maps and simple timeline widgets has enabled easy import of archival metadata for scholarly annotation. Most tools are rigid in their conception of space and modern in their expression of geography. Google’s TimeMap project, for instance, does not allow for the use of historical maps that require higher-order transforms such as re-projection or skewing to match a modern street grid. Other, hosted

services (like Dipity and GeoCommons) have simple mapping and temporal features, but are not open, extensible, or easy to integrate with historical maps and offline archival materials. Although their ease of use and the inherent value of spatial and temporal lenses through which to view the humanities has brought such tools quickly into classroom application, they remain ill-suited to the modeling and close, customizable, and inherently narratological meaning-making needs of scholars.

On a more technical note, we have observed that over the past quarter-century of evolution in geospatial technology, a simple but remarkably limiting form of data arrangement has been the norm. The predominant GIS tools segregate geometrical types of data (points, lines, polygons, and collections of these objects) into separate data stores and handle their processing and visualization as separate tasks. While technical demands for speed and efficiency once made this practice necessary, it is no longer required. Unlike most commercial GIS software enterprises, open-source efforts are working in a more modern framework. The spatial technologies on which Neatline are built are more intuitive for humanists, enabling them to treat features of all types on an even footing. If a road and a village green are both important in a particular context, the Neatline user will be able to reference and examine them with equal ease, and without a conceptual understanding of the different ways these shapes are treated in a GIS.

The most notable software contribution to the field of geospatial and temporal

visualization in the digital humanities is a late-1990s Java applet from the University of Sydney's Archaeological Computing Laboratory, also (like Google's tool) called TimeMap. It has been very slow to penetrate the humanities community – and particularly to excite developers who might contribute to its source code – despite widespread recognition of the need for such a tool. The Sydney TimeMap is a heavy-duty application-building framework, calling for a hearty infrastructure for development and hosting. Many scholars using it will require significant consultation and data entry support. Unlike Omeka and our simple-to-install Neatline plugins, TimeMap does not lend itself to the easy experimentation that would attract a base of users not already committed to intensive digital work. Both the Google and Sydney TimeMap applications and a number of other geo-temporal visualization tools – including Neatline – were analyzed against a dozen core criteria in 2009 as part of the Scholars' Lab's Start-Up grant bid. Criteria for comparison included various measures for ease of use and suitability to the kinds of data (including scanned historical maps) that humanities users – particularly scholars interested in archival materials – require. By the time its core plugins are complete, Neatline is projected to meet eleven of these benchmarks. Its closest analogue, the Sydney TimeMap tool, met five.

Planning for future, more nuanced temporal aspects of the Neatline project are informed by project director Nowviskie's experience in the visualization of time for humanities inquiry, gleaned as designer of the SpecLab prototyping project, "Temporal Modelling." This Intel-funded initiative (2001-2003), which began with an interdisciplinary faculty

seminar and was conducted in collaboration with artist and visual studies expert Drucker, prototyped software to express the subjective experience of time (discontinuous, anti-metrical, cast with prospect and retrospect, inflected by emotion) as we find it in literary and historical documents. Temporal Modelling was also the framework for much thinking and experimentation about the role that digital tools could play in bringing graphesis to humanities interpretation. Drucker and Nowviskie presented their research in several public venues and it is documented in Nowviskie's 2004 dissertation (*Speculative Computing: Instruments for Interpretive Scholarship*), in a co-authored chapter of the 2005 Blackwell's *Companion to Digital Humanities*, and in *SpecLab*, a monograph by Johanna Drucker, published by Chicago UP.

Finally, one of Neatline's chief innovations is in providing a concrete link between archival descriptive metadata and second-order interpretive scholarship. There have been remarkably few attempts to build on EAD in the creation of scholarly visualizations and interpretive interfaces. A notable effort is the ArchiveZ EAD visualization tool from the University of Maryland, funded by a 2008 NEH Start-Up grant. ArchiveZ is, however, geared toward algorithmic visualization of the internal relations among EAD files conceived (properly) as finding aids, rather than as an interpretive, editorial space for scholarly contribution and output. Still, this investment by NEH (and the research the grant references, including adoption studies among libraries and cultural heritage institutions) demonstrates recognition of the growing centrality of EAD in archival practice.

UVA Library's engagement with Web-based geospatial visualization dates to the mid-1990s, when our Geospatial and Statistical Data Center began to consult on and produce innovative Web applications in collaboration with faculty and with centers such as IATH and VCDH, the Virginia Center for Digital History. When GeoStat – which had largely served the environmental science and architecture fields – folded into the newly-created, humanities- and social science-focused Scholars' Lab in 2006, support for GIS applications to humanities scholarship gained momentum. Through an internal UVa Library Innovation grant awarded to Scholars' Lab staff and director Bethany Nowviskie, we constructed a geospatial data infrastructure using best-of-breed open-source components and Web service standards – the same tools that informed our plans for Neatline. The design of a "Spatial Data Portal," built on this infrastructure was informed by a semester-long faculty/grad seminar on the topic of *GIS in the Humanities*, hosted by the Scholars' Lab and led by GIS specialists Kelly Johnston and Chris Gist. Senior Scholars' Lab developer Adam Soroka served as chief architect for the system, which has now been deployed to a dedicated hardware platform. The purchase of this hardware and major investment of staff time in spatial metadata creation, map georectification, and software development demonstrates UVA Library's institutional commitment to these technologies and their use by students and scholars across the disciplines.

Prior to the Start-Up grant, our development effort was displayed in greatest detail at

Code4Lib, a librarian-technologists' conference held in Providence, RI, in 2009. At this event, Soroka offered both an invited workshop and a presentation. Neatline evolved directly from a demonstration application constructed for this workshop, using EAD metadata from Brown University Library's collection of primary resources relating to the horror writer H.P. Lovecraft, whose letters and stories meditate on early 20th-century Providence in revelatory ways. This proof-of-concept application, constructed and populated with data over the course of several weeks, demonstrated the interpretive power of geo-temporal visualization of EAD-described material and the need for simple spatial data mapping and creation interfaces. In the weeks following Code4Lib, Soroka and the Scholars' Lab were approached repeatedly by peer research libraries and governmental agencies (such as the Virginia Legislature and the USDA) for guidance in bringing open-source GIS to their constituencies.

Several presentations preceding and during the course of the Start-Up grant outlined the technical and interpretive possibilities of the larger framework that informs Neatline. Nowviskie gave invited lectures on spatial humanities and presentations on this project at the Royal Society in London, the University of Canberra, Victoria University of Wellington, the University of Maryland, the NEH, the Library of Congress, and at James Madison University. She also gave an invited workshop on GIS and historical maps at an ALA/ACRL Rare Books and Manuscripts conference in 2010 and, along with Head of Scholars' Lab R&D Wayne Graham, joined a panel on the "spatial turn" at STS 2011, the meeting of

the Society for Textual Scholarship. Nowviskie, Soroka, Gist, Johnston, and former Head of Scholars' Lab Public Services Joseph Gilbert formed a related GIS panel ("New World Ordering") at Digital Humanities '09 and Nowviskie presented a poster on graphesis at DH '10 in London. The research informing that poster was shared at the 2009 gathering of the Scholarly Communication Institute (a three-day institute on "spatial technologies and methodologies") and at the 2010 NEH Institute for Enabling Geospatial Scholarship, and published in December 2010 as "*Inventing the Map*" in *the Digital Humanities: a Young Lady's Primer*, in a special issue of the *Poetess Archive Journal*. Gilbert and Graham received feedback from the history community when they attended the 2010 meeting of the Organization of American Historians to discuss our GIS infrastructure and its implications for Neatline. Finally, Nowviskie will give an invited talk ("How to Play with Maps") and offer a Neatline workshop at "Space/Place/Play," a conference of CWRC, the Canadian Writing Research Collaboratory. By the end of 2011, Neatline will have been presented in at least 17 venues in 5 countries, on 3 continents.

Neatline's Architecture and Feature Set:

Neatline, as a system, is structured to combine multiple interacting services under a unified user interface. It is a simple example of a "service-oriented architecture." The advantages of such a design include:

1. a loose style of coupling between components that permits of their flexible redesign or replacement;
2. easy extension and reuse of components;
3. the possibility to use some but not all of the system;
4. the use of appropriate programming frameworks for different tasks.

The components that comprise Neatline divide roughly into two categories: the powerful and well-known geospatial Webservice engine GeoServer, and a collection of plugin software for the Omeka framework.

The GeoServer engine is the product of an ongoing effort from an large and well-distributed international community. Its primary goal is to instantiate the suite of geospatial Webservices promulgated by the Open Geospatial Consortium and ISO Technical Committee 211 (Geographic information / geomatics). The fact that internationally-recognized standards are at the heart of a key component in Neatline has very positive effects, as we shall see.

The other category of components are plugins for the Omeka framework. They will be described in more detail below, but at this point it is appropriate to note that they compose end users' entire interface to Neatline. No user is expected to normally interact directly with GeoServer. This is in alignment with our goal to emphasize ease-of-use, because to

work directly with GeoServer requires a level of technical expertise inappropriate to expect of scholars without particular experience in the technologies it incorporates.

In line with our fourth point about SOA, we can cite an immediate benefit: that while GeoServer is written in the fast and powerful (but difficult to use) compiled language Java, our Neatline plugins are written in the relatively easy to use, interpreted language PHP. It is much easier to learn or find personnel with expertise at PHP than it is to learn Java or find Java programmers, and the practical effect is that while Neatline users have the benefit of Java's power, they are able to compose their projects' appearance and behavior with the ease and inexpensiveness of PHP.

However, we have introduced a less attractive quality into our architecture with this two-pronged formulation. GeoServer's strength is in handling geospatial data, which becomes most interesting and comprehensible to scholars as it acquires graphical representation. But Omeka's strength is in handling textual data, and it offers users a default interface that relies heavily on traditional text-based Webforms for entry and editing. Bridging this difference became a major theme of this first round of Neatline development.

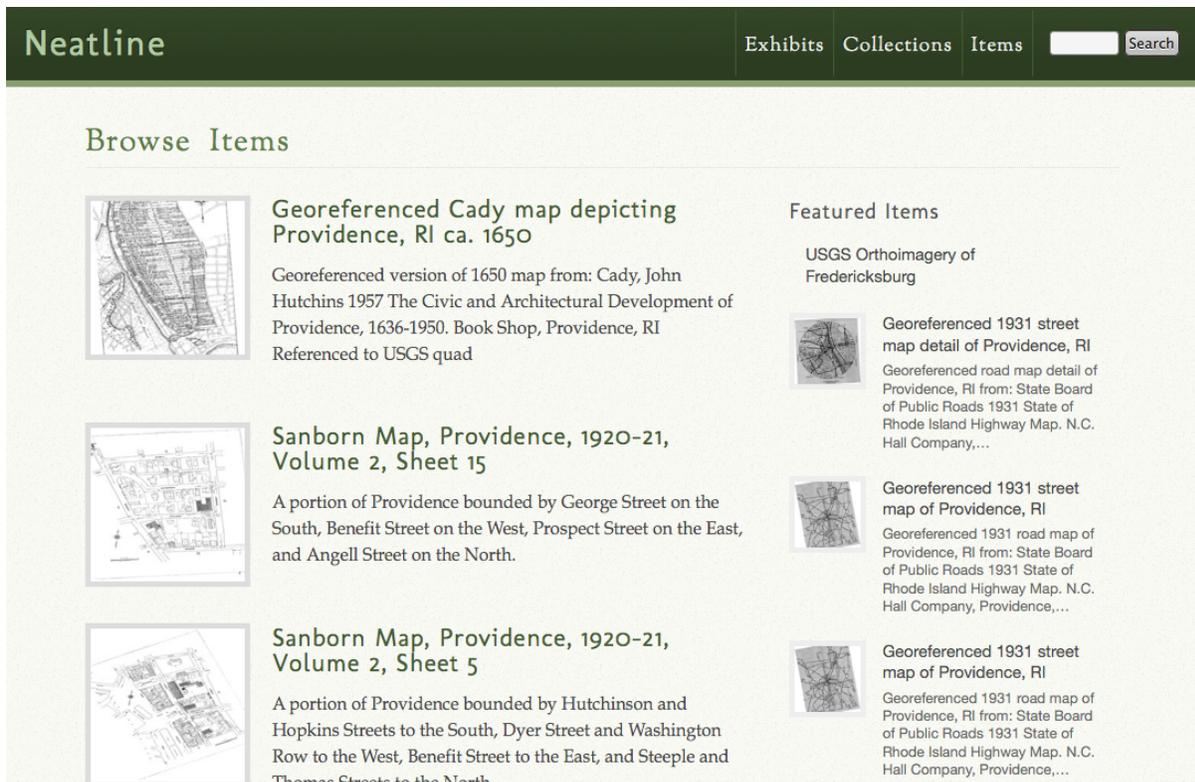


Fig 2: An Omeka collections view, showing content using Neatline plugins.

We can describe Neatline’s general abilities by moving through four areas of scholarly activity:

1. importing archival content and descriptive contexts;
2. storing and providing access to geospatial data;
3. visualizing sequence;
4. and presenting views on combined data.

Neatline begins with an Omeka plugin named EAD Importer, which as its name would have us believe, makes it easy and straightforward to import Encoded Archival Description

documents into an Omeka collection. Since EAD is the premiere standard for marking up archival content electronically, this opens the door to a vast universe of archive descriptions published by research institutions, many containing valuable commentary by curators and archivists. By using EAD Importer, a Neatline user can begin a project facing not a blank scholarly field, but a well-populated arena of objects of interest on which to comment and experiment. We expect that this plugin will find considerable use even by parties otherwise disinclined to experiment with the sort of visualizations that Neatline affords.

In the second realm, Neatline offers extremely powerful operations on both geospatial imagery and discrete geospatial data, through two of its Omeka plugins: Neatline Maps and Neatline Features. It replaces GeoServer's powerful but arcane interface with one much easier to use and importantly, one that is fully integrated into Omeka's preexisting forms and workflows. Adding a georeferenced map to an Omeka collection is now just as easy as adding a simple image – nothing more than a file upload through a web form. The map can then be treated in Omeka either as a flat image (the only way maps could be represented in Omeka before the Neatline project) or, newly, as an interactive, cartographic and spatially-enabled object, able to be combined with other geospatial data and operated upon as true GIS information. This ease of use does come with some costs. Geospatial imagery can be very large. Uploading a file through Web forms and HTTP can be a limiting factor on the size of maps that can be handled with Neatline, although GeoServer's abilities go far

beyond this limitation. However, we have not found this limitation be particularly annoying in practice. Another limitation arises from the use of GeoServer as engine. GeoServer can store and process a very large variety of file formats for geospatial imagery, but that variety is not infinite. It is possible to obtain spatial data or imagery that GeoServer will not handle without special processing. Again, we have not found this limitation problematic in practice. The variety of options in GeoServer by default is wide enough to cover virtually all commonly-used formats.

Once a map is available in the Omeka/Neatline context, it can be used in a number of ways. Immediately, it can be examined or exhibited as an interactive map resource, featuring panning, zooming, measurement in scale, and other common GIS operations. Discrete geospatial data can be overlaid and multiple maps can be combined. The map can used in Omeka exhibits as a first-class resource, like a document or simple image, but with all of its interactive functionality available. In addition, thanks to the GeoServer engine powering Neatline, when a map is used in combination with other geospatial resources it is automatically reprojected and rescaled to combine appropriately, saving users considerable tedious work and obviating the need for considerable technical knowledge in order to use a map made in one standard projection with a map in a different one -- or to use an historical map with a modern one. Lastly, Neatline provides access to uploaded imagery through the world-standard Web Map Service (WMS) Webservice protocol, enabled the sharing of resources not just between Neatline projects, but among Neatline

projects and projects using almost any other kind of geospatial engine. This last provision makes it possible for users to publish not only their finished exhibitions, but to publish the underlying imagery at the foundations of their arguments in an immediately reusable form.

Neatline

Exhibits Collections Items Search

Charlottesville 1907 Sanborn Map #13

◀ Previous Next ▶

Item Information

TITLE
Charlottesville 1907 Sanborn Map #13

SUBJECT
Charlottesville

DESCRIPTION
Map of part of Charlottesville from 1907.

CREATOR
Sanborn Fire Insurance Co.

COVERAGE
start=1919-09;end=1920-09

BACKGROUND
6 35 38

CITATION
Sanborn Fire Insurance Co., "Charlottesville 1907 Sanborn Map #13," in Neatline, Item #43, <http://neatline.scholarslab.org/items/show/43> (accessed November 26, 2010).

Header 1
Text

About Neatline
Neatline is a project of the Scholars' Lab at the University of Virginia Library. Adam Soroka and Bethany Nowviskie are co-directors of the work, which is funded through the generous support of the National Endowment for the Humanities and the Institute of Museum and Library Services.

About Us
Neatline is a project of the University of Virginia Library's Scholars' Lab and is proudly powered by Omeka.
© Rectors and Visitors of the University of Virginia

VISIT US
WRITE TO US

SCHOLARS' LAB

Fig 3: A georectified historic map, shown in Omeka item view.

Neatline also offers tools to work with discrete geospatial data. Feature data (as it usually called in the world of geospatial technology) is attached to Omeka items as metadata like any other piece of metadata. In fact, the same editors that allow easy editing of

item metadata seamlessly allow editing of shapes and collections of shapes associated with those items. Since Omeka's editors are built on textual Web forms which would be infelicitous for editing graphical elements, we have constructed new components for those Omeka forms that present graphical interfaces with convenient and powerful drawing and annotation tools. With these means, multiple arbitrarily-complex shapes can be attached to an item as well as distinguished uniquely and annotated with names and descriptions. Behind the scenes, those graphical metadata are translated into Geographic Markup Language (GML), a powerful (if dense) code for encoding geospatial features and relationships. This markup is then stored in metadata fields directly associated with the Omeka item in question for retrieval and rendering or export and other use. GML is another international standard which allows of easy data interchange amongst projects.

Unlike with imagery, Neatline is not currently able to provide a Webservice exposing geospatial feature data -- this would be Web Feature Service (WFS), the feature-related "cousin" of WMS -- because we do not currently decompose and index the data any further than has been described. This may be an avenue for future development.

Once features and maps have been made available in a Neatline/Omeka project, they can be combined (as mentioned above) in visualizations. Features can be overlaid on maps to provide commentary on either, and geographic relationships can be made apparent, even when they vary through time.

This brings us to the third major group of Neatline functionalities: visualizing sequence. For Neatline, we have constructed an Omeka plugin that incorporates the Simile Timeline Javascript timeline construction toolkit. (This was a much-requested addition to Omeka's arsenal of plugins, and is another example of the Neatline project's contribution to digital scholarship far beyond the audience who might be interested in explicitly geo-temporal interpretation of archival collections.) By basing our Timeline plugin on the Simile code, we inherit Simile Timeline's simple, linear, and completely metrical model of time and sequence. Adding Omeka items to a sequence is no more difficult than assigning a date to them using Omeka's metadata editors, and tagging them using Omeka's built-in tagging infrastructure. Then a timeline can be produced (as a first-class item in Omeka) which displays all of the items associated with a given tag. Those with an assigned date display appropriately on the timeline, while those without specified dates (as can be common in archival collections) are displayed in an auxiliary view. This kind of timeline can then be examined on its own or used in Omeka exhibits, much like a Neatline map.

Lastly we come to the most important set of abilities in Neatline: the presentation of views of combined data. Because the interface of a Neatline project lives inside an Omeka instance, we are able to take advantage of Omeka's machinery for assembling exhibits to produce Neatline views. In fact, to produce a Neatline exhibit is exactly to produce an Omeka exhibit using Neatline-powered items and then to enable it with the fifth major

Neatline Omeka component: Neatline Theme.

Neatline Theme is a customizable library of Javascript and CSS that, when applied to an Omeka exhibit, connects any Neatline-powered items in the display with special behaviors for the end user. A good example of these behaviors is the ability to click on any item displayed in a timeline to zoom instantly to its representation on a map and find tools for graphical editing and annotation available -- or instead to go to an Omeka metadata editing page to alter or comment on that item. It is here that we find the idea of graphesis returning strongly. In a well-assembled Neatline exhibit, the line between examination and annotation in the graphical context almost disappears. To discover a geographical fact that deserves remark is instantly to be able to comment on it in a useful, graphical way.

Neatline's first iteration of technical development has been fruitful and fun, but it has real limitations. One of the most crucial is the manner in which discrete geospatial data is currently encoded as metadata attached to Omeka items. This design unfortunately makes it impossible to do two things that would be very useful. Firstly, we cannot reuse feature-encodings across distinct objects. If a geographical shape (say, the footprint of a house) is of interest in two different item-contexts (say, a hand-drawn map in a letter, and a contemporary Sanborn map including the feature), it must be attached to each separately, and thenceforth updated and edited separately if future changes are necessary. It would be better if geographical shapes existed in the Omeka framework as first-class objects, with

their own metadata. The fact that as of yet they do not prevents us from taking another step (previously mentioned). We cannot currently expose feature data as a useful Webservice. This, too, would become much easier if shapes were reified as full-fledged Omeka items. Lastly, this would allow for the application of data-indexing techniques specialized to spatial data, which would improve the performance of searching within collections as well as open the door to new kinds of spatially-based searching. If, however, we were to do this, it would require that Omeka support more powerful forms of object linkage and relationship expression than it currently does, a project that the Omeka group at CHNM has agreed would be worthwhile.

In the realm of presentation, we feel that our current Neatline Theme module is attractive and well-designed, but know it could be better. More and more powerful forms of behavior could be supplied in exhibits, and those already present could be refined and made more flexible. We look to a community of users to guide this kind of development by requesting features and developing their own -- and expect that Neatline will also benefit from attention by lead Omeka designer and research director Jeremy Boggs, who is joining the Scholars' Lab in the new role of Humanities Design Architect.

Lastly, we recognize that the model of time we have inherited from the Simile Timeline framework is very simple. Its linearity and metrical constancy limit its expressive power and its ability to encode complex scholarly arguments or to represent those very qualities

of humanities information (such as temporal ambiguity, uncertainty, discontinuity, subjectivity, and contingency) that most draw scholars' attention. We look to the Temporal Modeling Project -- newly revived with the support of the Canadian funder SSHRC to a CWRC research team led by Stan Ruecker and including Bethany Nowviskie and Wayne Graham of the Scholars' Lab -- to provide inspiration as to how we might move beyond this limitation.

Challenges and Next Steps: Omeka + Neatline

The Scholars' Lab has learned a great deal and grown as a center and a team through our work on the Neatline project. We originally intended to produce an application which stood alone and collected its own community of interested scholars. Instead, we have been able to "piggyback" on the community of interest already surrounding Omeka, which is particularly helpful because that community is naturally aligned to ask the kinds of questions we hoped to encourage and support with Neatline. Collaborative relationships with CHNM, both at the developer and managerial levels, have been greatly strengthened through work on this project, and we feel that both centers have learned from the partnership.

At the technical level, the Scholars' Lab was continually challenged to find a balance between offering the complete power of the tools we leveraged (particularly GeoServer)

and offering an attractively-simple experience for the majority of users. It is not yet clear how well we succeeded. Using our apparatus requires a considerable degree of initial action from technical support staff (for example, installing and maintaining a Java Web application container), and it is not yet clear whether that will prove an obstacle to adoption.

In some situations, we were also challenged by the distinction between the fundamentally graphical nature of Neatline's vision and the fundamentally textual underpinnings of the Omeka. Omeka instances expect inputs to their databases to be available as text, particularly as text entered in traditional Web forms. Neatline, on the other hand, bases its whole experience on a suite of graphical gestures. While in most cases, we were able to overcome the difference by clever programming that hides the underlying machine-readable text data behind a graphical interface, there remain places where this breaks down and the user is rudely shunted from operating in a graphical interface to operating through "texty" Web forms. This breaks the flow of graphesis and provides a frontier for continued development work.

We were pleased to be able to accomplish so much on Neatline, despite an unexpected restriction on the hiring of wage employees at the University of Virginia Library. The bulk of the NEH Start-Up grant was intended as salary offset for Adam Soroka, allowing us to hire extra help to compensate for time he and other members of our R&D division

(including Ethan Gruber and Wayne Graham) spent in development of Neatline. Shortly after the disbursement of funds, UVa Library came to the difficult decision – due to the financial crisis in the state of Virginia – that wage positions would be phased out and no more temporary employees hired. We sought unsuccessfully for some time to hire student programmers (still permitted) to fill our need, before finding a qualified collaborator in undergraduate Sam Ebespracher. Meanwhile, we continued development of Neatline and re-prioritized some other projects in order to allow work to progress. This caused us to underspend slightly on the grant and to devote less time than planned to archival research and content development for our planned exemplar projects in history and literary studies, which have not yet been built out to our satisfaction for public release. As a consequence of our shift to Omeka plugin development, we also engaged less with our Neatline advisory board than intended. Staged releases for their feedback and review were less possible as development proceeded on many simultaneous fronts with an array of Neatline plugins.

In February 2011, the Scholars' Lab and CHNM announced a collaborative “Omeka + Neatline” initiative, supported by \$665,248 in funding from the Library of Congress. This two-year initiative is meant to improve existing plugins, add preservation workflows, and refine the Neatline toolset. On CHNM's side, enhancements to Omeka's core APIs, improved documentation, regular “point” releases, and a new Exhibit Builder under the auspices of the project are intended to strengthen Omeka's user and developer communities.

Omeka + Neatline was one of six contract awards made by the Library of Congress in a program that aims both to improve LoC's own content management and delivery infrastructure and to contribute to collaborative knowledge sharing among broader communities concerned with the sustainability and accessibility of digital content. In July of 2010, approximately \$3,000,000 was targeted toward Broad Agency Announcements covering three areas of research interest related to these goals. Technical proposals were openly solicited from expert, multi-disciplinary communities in both academic and commercial settings in the following areas: Ingest for Digital Content, Data Modeling of Legislative Information, and Open Source Software for Digital Content Delivery. The Neatline + Omeka project (guided by Nowviskie and CHNM managing director Tom Scheinfeldt) falls into the latter category. It is additionally an opportunity for the Scholars' Lab and CHNM to document and disseminate a model for open source, developer-level collaborations among library labs and digital humanities centers, and a white paper on this topic is one of the contract deliverables.

While the Scholars' Lab did succeed at constructing the major technical elements necessary to support the interpretive activity we envisioned in our NEH Start-Up grant, it is true that each of our Omeka plugins is very young and has rough edges. We have not yet created a fully polished experience for our users. Using the Neatline apparatus, at this stage of its development, requires a healthy degree of technical skill and a willingness to experiment. In addition, final integration of our plugins into a unified editing environment that

embodies and promotes the brand of *graphesis* we proposed in our application is not yet finished. We expect to complete and articulate the value of that work under the auspices of the Library of Congress's funding. We are also turning our attention to improved communications about the project, creating a greatly-improved website, available later this year at <http://neatline.org/>. This site will replace the current Neatline blog and is intended to describe each of our plugins and how they work together, include screenshots and "how-to" screencasts, and link to discussion, documentation, and exemplar applications of the Neatline tool in the context of two archival collections -- an effort we continue under the auspices of the Neatline + Omeka project.

We'd like to thank NEH for its generous support -- both financial and in terms of the helpful advice and enthusiastic advocacy of the staff of the Office of Digital Humanities -- and to express our continued excitement at what Neatline promises to offer scholars and archivists. Work on this project is situated exactly at the nexus of what we feel makes the Scholars' Lab interesting and special: deep expertise in interdisciplinary digital scholarship and GIS (deepening, as we have hosted an NEH IATDH institute on "Enabling Geospatial Scholarship" and supported the work of a number of spatially-oriented Graduate Fellows in Digital Humanities), coupled with a singular appreciation for archival information and library culture, by virtue of our embeddedness in a major research library with rich and unique holdings. We hope that one side effect of our work on Neatline will be increased willingness of other libraries to support staff-initiated research-and-development projects,

and to embed R&D teams with the librarians who support methodological work by scholars interested in spatial and text technologies.

Related Links:

Main informational site for Neatline: <http://neatline.org/>
Page detailing our plugins: <http://www.scholarslab.org/projects/omeka-plugins/>

Plugin documentation and open-source code releases enabled by the Neatline grant:

<http://omeka.org/codex/Plugins/EadImporter>
<http://omeka.org/codex/Plugins/Timeline>
<http://omeka.org/codex/Plugins/FedoraConnector>
<http://omeka.org/codex/Plugins/GenericXmlImporter>
<http://omeka.org/codex/Plugins/NeatlineFeatures>
<http://omeka.org/codex/Plugins/NeatlineMaps>
<http://omeka.org/codex/Plugins/SolrSearch>
<http://omeka.org/codex/Plugins/TeiDisplay>
<http://omeka.org/codex/Plugins/VraCoreElementSet>

“Omeka + Neatline” press release: <http://www.scholarslab.org/announcements/scholarslab-and-chnm-partner-on-omeka-neatline/>

Bethany Nowviskie, “Inventing the Map’ in the Digital Humanities: a Young Lady’s Primer.” *Poetess Archive Journal*. Vol 2, No 1 (2010):
<http://paj.muohio.edu/paj/index.php/paj/article/viewArticle/11>